REMARKS

Claims 1-10 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the remarks contained herein.

REJECTION UNDER 35 U.S.C. § 102 – MOUREAUX

Claims 1-3, 5, 6, 9, and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Moureaux (U.S. Pat. No. 5,036,110). This rejection is respectfully traversed.

The present invention is to a gas-filled cushioning device that includes a multi-layer film formed into a gas-filled membrane having an interior compartment that contains at least one capture gas constituent. The multi-layer film has a first layer and a second, outer layer. The first layer includes up to 50% by weight of aliphatic, thermoplastic polyurethane and a copolymer of ethylene and vinyl alcohol (EVOH); the second layer includes a flexible resilient elastomeric thermoplastic material. The multi-layer film resists outward diffusion of the capture gas constituent but permits inward diffusion of a mobile gas constituent. Furthermore, the first layer and the second, outer layer hydrogen bond to each other along a segment of the multi-layer film.

There are several facets of the present invention that are absent from the Moureaux reference. First, Moureaux fails to limit the amount of polyurethane up to 50%. Second, Moureaux fails to disclose the use of an aliphatic polyurethane. Finally, Moureaux does not perform sheet co-extrusion at temperatures and pressures to permit hydrogen bonding to be maintained between a segment of the first layer and second

layer. The membrane in Moureaux also fails to produce the corresponding gas transmission rates of the present invention. Consequently, the Moureaux reference does not anticipate the present invention.

The multi-layer film in a gas-filled cushioning device of the present invention has a first layer. This first layer includes an aliphatic thermoplastic polyurethane and a copolymer of ethylene and vinyl alcohol (EVOH). Claim 1 expressly limits the amount of polyurethane by "up to about 50 wt. % of aliphatic thermoplastic polyurethane." See claim 1; see also application page 28, line 15. As a result, the first layer of the present invention includes about 50 wt. % *or more* of EVOH. In contradistinction, the second material of Moureaux is only between about 5% and 20% EVOH. See col. 2, lines 25-29. Correspondingly, Moureaux discloses a thermoplastic polyurethane proportion between about 80% and 95%. Simply put, the Moureaux membrane, with 80-95% polyurethane is *not* the same as the first layer of the present invention, which has only up to about 50% wt. of aliphatic thermoplastic polyurethane. The compositions of these materials do not overlap, and, therefore, Moureaux does not anticipate the present invention.

It is important to note that the Moureaux reference appears to contradict itself regarding the amount of thermoplastic polyurethane relative to EVOH. For example, the proportion of the second material in the **membrane** lies between about 5 and 20% of EVOH. See col. 2, lines 25-29. But, the film-like **graft polymer** is said to be in a proportion of 50% to 95% of the second material (EVOH) with respect to the first material (polyurethane). See col. 2, lines 36-39.

Applicants respectfully point out that Moureaux is disclosing two different and distinct features, the first being the overall composition of the **membrane** and the second being the composition of an embedded **graft polymer**. Specifically, Moureaux teaches a **graft polymer**, formed by covalently reacting polyurethane with EVOH. See col. 2, lines 10-24; and see accompanying chemical reaction scheme. Next, it is disclosed that in the impervious resilient **membrane** of Moureaux, there is 5-20% EVOH with respect to thermoplastic polyurethane. See col. 2, lines 25-29. This corresponds to 80-95% polyurethane in the overall membrane. Moureaux further states that a membrane can contain at least one film based upon the **graft polymer**, where the film has a thickness of 10-200 microns. The film-like **graft polymer** results from mixing thermoplastic polyurethane in a proportion of 50% to 95% of EVOH with respect to polyurethane (5-50%). It follows that since Moureaux teaches the EVOH (second material) is embedded into the body of the polyurethane (first material) (see col. 1, line 56 to col. 2, line 2), the **graft polymer** is correspondingly embedded into the body of the polyurethane. This suggests that 5-20% of **graft polymer**, being a covalent reaction of 50-95% EVOH with 5-50% polyurethane, is then embedded into a body of 80-95% polyurethane, to form a **membrane** with only 5-20% EVOH overall. This is the only interpretation that is consistent with "the **graft polymer** forming islets in the thermoplastic polyurethane matrix as is well seen on FIG. 1." See col. 5, lines 62-65; and see FIGURE 1; emphasis added. See also holding of BPAI Decision 01-16-2003, Ex parte Bonk et al., Appeal No. 2001-0168, regarding Application No. 09/170,790 (now issued US Pat. No. 6,599,597), which shares common origin with the present application.

The gas-filled cushioning device of the present invention and the Moureaux membrane also exhibit dissimilar physical properties. For example, the gas transmission rates of the present invention and the Moureaux reference are incomparable. The present invention can reduce gas transmission rate values from *over* 2-fold for 50% EVOH (e.g., 29.0 cc/(m^2*atm*day) divided by 14.01 cc/(m^2*atm*day) = 2.07 fold) up to nearly a 37-fold reduction for 90% EVOH (e.g., 29.0 cc/(m^2*atm*day) divided by 0.79 cc/(m^2*atm*day) = 36.7 fold) when compared to 100% TPU (i.e., polyurethane alone). See Table 1; and see pages 45-46. In contrast, the Moureaux membrane shows *less than* a 2-fold reduction (e.g., 76 m^2*Pa^{-1}*s^{-1} is only a 1.9-fold reduction from 145 m^2*Pa^{-1}*s^{-1}) in perviousness to nitrogen. See Moureaux Table 2; see also col. 6, lines 37-42, where "the gain in imperviousness of the membrane...is of the order of 90%" [e.g., (145 m^2*Pa^{-1}*s^{-1} – 76 m^2*Pa^{-1}*s^{-1})/(76 m^2*Pa^{-1}*s^{-1}) = 90.8%]. Accordingly, the first layer of the present invention and the membrane of Moureaux are notably different materials, having different limits on EVOH content, and different properties in controlling diffusion of gases.

The present invention further limits the polyurethane used in the first layer of a multi-layer film to an aliphatic thermoplastic polyurethane. In contradistinction, there is no such disclosure, limitation, or suggestion in Moureaux to limit the thermoplastic polyurethane to only aliphatic polyurethanes. Thus, the present invention expressly identifies and requires a species of the polyurethanes, namely aliphatic polyurethanes, which have a greater level of flexibility when compared to more rigid aromatic polyurethanes. Acceptable flexibility is one of the goals of the present invention (see pages 2 and 8), which is achieved in part by using aliphatic polyurethanes. As such, the

Moureaux reference does not anticipate the claims for the additional reason that it does not disclose present invention's limitation to aliphatic polyurethanes in the first layer.

Finally, the multi-layer film of the present invention expressly exhibits hydrogen bonding along a segment of the film between the first layer and the second layer. The H-bonding in the present inventive multi-layer film is not disclosed, suggested, or appreciated in the Moureaux reference. In particular, the H-bonding of the present invention, while not wishing to be limited by theory, is believed to contribute to the ability of the inventive multi-layer film to resist delamination and advantageously precludes the need for an adhesive tie layer. See pages 11-12. "The aliphatic thermoplastic polyurethane and ethylene vinyl alcohol copolymer employed are *not* modified in an effort to create cross-linking or conventional covalent bonding between the two layers; nor are any tie-layers or adhesive employed." See page 38; emphasis added. The present invention tries "to maximize and rely primarily upon hydrogen bonding occurring between the respective layers." See page 38. This is in contrast to the Moureaux reference, where the polyurethane and the copolymer of ethylene and vinyl alcohol are purposefully reacted to form covalent bonds linking the polymers. See col. 4, lines 5-20. Furthermore, the Moureaux reference demonstrates this covalent grafting by multiple means – thermogravimetric analysis; gas chromatography; and viscosity measurements. Col. 4, line 31 to col. 5, line 42. Thus, in addition to failing to anticipate the present invention for this third reason, Moureaux specifically teaches away from relying on H-bonding.

The desired significant H-bonding between the layers in the present invention can be formed by film extrusion, including sheet co-extrusion. See pages 38 and 41.

Such methods, including other plastic forming processes, can incorporate "a consistent melt of the resinous thermoplastic urethane, and blended aliphatic thermoplastic urethane and copolymer of ethylene vinyl alcohol [to obtain] the desired extensive hydrogen bonding therebetween across the intended length or segment of the laminated product." See page 44. For example, embodiments of the present invention maintain "temperatures of from about 300°F to about 450°F" and "pressures of at least 200 psi at the point where the layers are joined and hydrogen bonding occurs." See page 44. No such disclosure, suggestion, or appreciation of such H-bonding or of the temperatures and pressures used to obtain such H-bonding are found in the Moureaux reference. Thus, the H-bonding expressly disclosed in the present invention and means to fabricate a multi-layer film possessing such H-bonding, are absent from the Moureaux reference.

Thus, the Moureaux reference fails to disclose several features of the claims. Specifically, Moureaux does not disclose a multi-layer film with a first layer having up to 50% by weight of aliphatic, thermoplastic polyurethane. Instead, Moureaux discloses a membrane having 80-95% polyurethane, well in excess of the 50% limit of the present invention. Moureaux also does appreciate and expressly use the species of aliphatic polyurethanes, as in the present invention. The resultant membranes of the present invention and the Moureaux reference are also distinguishable by their physical properties, namely gas transmission rates. Finally, the express formation of H-bonds between the multi-layer films of the present invention are absent from the prior art reference; likewise, the reference does not disclose employing the temperatures and

pressures used to form the requisite H-bonding. As such, independent Claim 1 and dependent Claims 2 through 10 are novel and not anticipated by Moureaux.

REJECTION UNDER 35 U.S.C. § 103 – MOUREAUX

Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Moureaux (U.S. Pat. No. 5,036,110). This rejection is respectfully traversed.

As discussed above, the gas-filled cushioning device of the present invention has at least one material difference in terms of composition and at least three features that are distinct in comparison to the Moureaux reference. The present invention is nonobvious in view of Moureaux as a result of these differences and the absence of any teaching or motivation for a skilled artisan to make the requisite changes.

Briefly, key distinctions between the reference and the present invention are as follows. First, the compositions of polyurethane relative to ethylene and vinyl alcohol (EVOH) in the present invention and the reference do not overlap. Furthermore, there is no suggestion, appreciation, or motivation in the Moureaux reference for a skilled artisan to lower the 80-95% polyurethane range in Moureaux to that of the present invention (*i.e.*, up to about 50 wt. % (maximum) of aliphatic thermoplastic polyurethane).

Second, the gas transmission rate values of the present invention and Moureaux reference are different, indicating dissimilar materials and properties. And there is no suggestion in Moureaux as to how a skilled artisan could modify the disclosure to achieve these gas transmission rates.

Third, the present invention expressly utilizes the aliphatic species of polyurethanes. In contradistinction, there is no such disclosure, appreciation, or

suggestion in Moureaux to limit the thermoplastic polyurethane to only aliphatic polyurethanes.

Fourth, the present invention discloses a hydrogen bonding interaction between layers that obviates use of adhesive and/or tie layers. This H-bonding, and the various temperatures and pressures that generate the H-bonding, are absent from the Moureaux reference; and, a skilled artisan would not be motivated by the reference to take advantage of this property in preventing delamination. In fact, Moureaux specifically teaches away from relying on H-bonding by emphasizing the covalent reaction between the polyurethane and EVOH.

The present invention also demonstrates the unexpected result that this H-bonding eliminates the need for an adhesive or tie layer. For example, an intermediate bonding agent is required for satisfactory colaminating polyvinylidene chloride and a urethane elastomer. See page 10. The particular temperatures and pressures used for coextrusion in embodiments of the present invention result in unexpected favorable results. In contrast, no such disclosure, suggestion, or appreciation of H-bonding, the temperatures and pressures used to obtain such H-bonding, or the result thereof, are found in the Moureaux reference.

For the aforementioned reasons, independent Claim 1 and its dependent Claim 4 are not obvious in view of Moureaux.

REJECTION UNDER 35 U.S.C. § 103 – MOUREAUX IN VIEW OF MATSUMOTO ET AL.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Moureaux (U.S. Pat. No. 5,036,110) in view of Matsumoto et al. (U.S. Pat. No. 4,410,595). This rejection is respectfully traversed.

Independent Claim 1 of the present invention is not obvious in view of the Moureaux reference for the reasons outlined in the preceding section of this Reply. Claim 7 of the present invention recites an EVOH copolymer having an ethylene content of about 25 mol. % to about 48 mol. %. While the Matsumoto reference suggests using an EVOH copolymer having a 31 mole % ethylene, there is no suggestion or motivation by the combination of Moureaux and Matsumoto to use only up to 50 wt. % polyurethane, with a corresponding 50 wt. % or more of EVOH. Thus, no combination of Moureaux and Matsumoto would produce the first layer of the present invention, regardless whether 31 mole % ethylene is used in the EVOH proportion or not. Consequently, Claims 1 and 7 of the present invention are not obvious based on Moureaux in view of Matsumoto.

REJECTION UNDER 35 U.S.C. § 103 – MOUREAUX IN VIEW OF SMITH ET AL.

Claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Moureaux (U.S. Pat. No. 5,036,110) in view of Smith et al. (U.S. Pat. No. 5,450,235). This rejection is respectfully traversed.

Independent Claim 1 of the present invention is not obvious in view of the Moureaux reference for the reasons outlined above. Claim 8 of the present invention adds an aromatic polyurethane to the aliphatic polyurethane and EVOH components of

the first layer recited in Claim 1. The Smith reference teaches combinations of aliphatic and aromatic polyurethanes that retain their flexibility. Even so, the combination of Moureaux in view of Smith still does not teach a first layer that has up to about 50 wt. % aliphatic thermoplastic polyurethane, allowing 50% or more EVOH. The combination would have at most 5-20% EVOH as taught by Moureaux, and there is no suggestion, appreciation, or motivation for a skilled artisan to modify the composition of polyurethane relative to EVOH to produce the present invention. Consequently, Claim 1 and dependent Claim 8 are not obvious by combination of the above references.

DOUBLE PATENTING REJECTION – BONK ET AL. IN VIEW OF MOUREAUX

Claim 1 stands rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of Bonk et al. (U.S. Pat. No. 6,599,597) in view of Moureaux (U.S. Pat. No. 5,036,110).

Applicants respectfully traverse the rejection by providing a terminal disclaimer in compliance with 37 CFR 1.321(c), based on common ownership of Bonk et al. (U.S. Pat. No. 6,599,597) and the present application.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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